Scope

The Contractor will acquire, review, and evaluate all relevant planning documents (e.g., master plans, zoning ordinances, etc.) for each of the five prototype counties for all areas which could be affected by the range of water levels being examined in this study. The Contractor will generate likely land use projections in 10-year time-steps through the planning horizon for each of the alternate hydrologic scenarios. These projections need to be made at the most detailed scale practical (i.e., at the parcel level if possible), covering the immediate open lake shoreline, and all properties immediately adjacent to interconnected waterbodys upstream to the limit of backwater effects. Hence, this work needs to be conducted in conjunction with several other tasks outlined under this Delivery Order. (Amended March 11, 1999 to focus on only two counties: Allegan, MI and Manitowoc, WI.)

Determination of study areas

In determining an appropriate study area for Task 5.2, it is important to ensure that the selected boundaries will encompass an adequate amount of land area, thereby permitting a concise and broad analysis. A concise analysis is necessary to determine how a hydrologic scenario may directly affect a particular area. Similarly, a broad analysis is required to verify the subsequent affects on a region. After reviewing topographic maps, land use/land cover maps and local master plans and zoning ordinances, the following study areas were established:

- Allegan County, MI – the area west of the US 31/I-196 corridor with the exception of the Saugatuck area. In that case, in order to include the Kalamazoo River basin, the study area will encompass all but the most eastern edge of the Township boundary.

- Manitowoc County, WI – the area east of State Highway 42 from the county's northern border and around the Cities of Two Rivers and Manitowoc. South of the two cities, the boundary will include all area east of I-43 to the southern county line.

Document acquisition, review and evaluation

Acquisition

This first duty associated with Task 5.2 was completed for Manitowoc County, WI and Allegan County, MI during the months of July and August 1999. The focus of this collection has been the gathering of the most recent land use plans and zoning ordinances for every local community within the study area. The result of this effort, as shown in Tables 1 and 2, was fairly successful considering that Wisconsin does not require the land use plan as a state prerequisite to local zoning programs.

Table 1
Compiled Manitowoc County, Wisconsin[1], Planning and Zoning Documents

Community	Master Plan (date)	Zoning Ordinance (date)
Two Creeks Twp.	No	Yes (1988)[2]
Two Rivers Twp.	No	Yes (1988)
Manitowoc Twp.	No	Yes (1988)
Newton Twp	No	Yes (N/A)
Centerville Twp.	No	Yes (N/A)
City of Two Rivers	No	Yes[3] (1999)
City of Manitowoc	Yes (1999)[4]	Yes (1999)

[1] Wisconsin statutes do not require a Master plan as a prerequisite to zoning
[2] The townships of Two Creeks, Two Rivers and Manitowoc operate under the county zoning program
[3] Proposed for adoption. Shoreline/Floodplain Ordinance adopted in 1992
[4] Planned for adoption in June, 1999

Table 2
Compiled Allegan County, Michigan, Planning and Zoning Documents

Community	Master Plan (date)	Zoning Ordinance (date)
Laketown Twp.	Yes (1990)[5]	Yes (1981)
Saugatuck Twp.	Yes (1987)	Yes (1985)
Ganges Twp.	Yes (1991)	Yes (1994)
Casco Twp.	Yes (1985)	Yes (1986)
City of Saugatuck	Yes (1989)	Yes (1996)

[1] Amended in 1996

Additional information collected as part of this task were the:

- Michigan Resource Information System (MIRIS) Land Use/Cover Maps for Allegan County, MI (1978 and 1997).
- Current Land Use/Cover Inventory Map for Manitowoc County, WI (1992)[1].
- Tax assessment (parcel) map for Allegan County, MI.
- Aerial maps for Allegan County, MI and Manitowoc County, WI.
- USGS Quadrangle maps for Allegan County, MI and Manitowoc County, WI.

[1] The 1997 MIRIS and 1992 Wisconsin Current Land Use data were prepared by unrelated independent contractors working with each state. The MIRIS update was based on the 1979 base map.

All of the above information was used in some degree to determine the existing land use, 2020 future land use (FLU), and 2050 future land use within the two study counties. The extent to which each of these maps/plans were used was directly dependent upon the availability of higher valued maps/documents, such as master plans. This will be explained in further detail later in this report.

The MIRIS land use/cover maps which include parcel lines are being used as base maps to display compiled existing, 20-year and 50-year projected land use information in Allegan County, MI; similar maps, based on the Wisconsin Current Use Inventory maps were used in Manitowoc County. Unfortunately, the parcel mapping in the Wisconsin shoreline communities is less available than the Michigan areas.

Review and Evaluation

Since the categories and regulations used in planning and zoning often varies from one community to another, a composite land use and zoning glossary was created and used to compile local data into an understandable, consolidated format. The model composite selected for this task is one created by the Northwest Michigan Council of Governments (NWMCOG) for use among its ten constituent counties.

In Michigan, where MIRIS land use/cover data was used, and in Wisconsin, using the Current Use Inventory, there are at least forty-three different land use classifications identified. These categories were combined into five composite categories to create a more usable database. For example, in either dataset there are currently eight public and recreation categories. These eight were subsequently combined to create the *public/semi-public* land use category. The five composite categories were selected to most closely relate to tax assessment categories thus simplifying later damage assessment activities.

Table 3 identifies the proposed land use categories, as well as the compiled MIRIS land use categories. Several additional categories (i.e. Upland Grass, Upland Forest, Wetland-Lowland Conifer) also exist within the MIRIS maps, which have not been compiled into the proposed land use categories due to their tendency to represent land cover as opposed to land use. In order to identify the land uses in these areas, the aforementioned alternative documents have been utilized.

Table 3
Consolidated Land Use Categories

Proposed Land Use Categories	Original MIRIS Land Use
Residential	Res.-Low Multi-Family Res.-Single Family Res.-Mobile Home
Commercial	CBD Commercial Commercial Industrial
Agricultural/Open/ Vacant	Agriculture-Crop Agriculture-Orchard Agriculture-Feeding Agriculture-Farmstead Agriculture-Horticulture Agriculture-Other
Industrial	Extractive
Public/Semi-Public	Trans-air Trans-road Trans-Communication Trans-Pipeline Trans-Utility Recreation-Marina Recreation-Outdoor Recreation-Cemetery

A brief description of each of the proposed land use categories is provided below in Table 4. Existing land use information from available planning documents will also be tested against the new categories as a form of check and balance. Once the local information was compiled and standardized, it was digitized on an Existing Land Use Map (see Appendix).

Table 4
Land Use Classification System

Land Use	Description
Residential	Land occupied by all types of residential dwelling units including; ❖ single-family detached/attached dwelling units, seasonal dwellings, manufactured homes outside of designated mobile home parks, and their related accessory buildings such as garages; ❖ multiple-family dwelling units, being; structures which contain 3 or more dwelling units (i.e. apartments, townhouses), and accessory uses such as parking lots and small recreational facilities such tennis courts and swimming pools; and ❖ mobile home parks, being; land occupied by manufactured dwelling units sited in a planned community and their related accessory service structures and recreational spaces.
Public/Semi-Public	❖ Land and facilities that are publicly operated and available for use by the public. Examples include schools, government buildings, parks, sewer and water utilities, roads, correctional facilities, hospitals, airports, and marinas. ❖ Semi-public uses are land and facilities, which may be privately owned or operated but used by the public or a limited number of persons. Examples include churches, cemeteries, and private clubs.
Commercial	❖ Land that is predominantly occupied for the retail sale and/or service of products such as retail establishments, personal and business service uses, and repair service facilities. ❖ These uses may be located within a central business district, a planned shopping center, or a neighborhood commercial area. ❖ This category also includes various office uses including business, medical, law and other professional service offices and related service establishments.
Industrial	❖ Land occupied by manufacturing industries, processing facilities, warehouses, and non-manufacturing uses, which are primarily industrial in nature. ❖ Lands so classified may include areas with or without buildings where raw or semi-finished materials are fabricated or those using or storing raw materials for primary production or extractive operations such as mining sites.
Agricultural /Open / Vacant Land	❖ Includes lands under cultivation, animal farms, ranching operations, pastures, tree farms, and undeveloped lands including forested land, wetlands, and barren lands.

Source: Wade-Trim and Michigan Land Cover/Use Classification System, 1976

Trend Projection

Intervals for the years 2020 and 2050 were selected over the originally proposed 10-year intervals for two fundamental planning reasons: twenty years is the accepted life of a local land use plan and fifty years is the economically useful life expectancy of most residential dwellings. Land uses do not generally undergo rapid or dramatic changes once land is developed. That is, once land is developed as a use, such as housing or retail sales, future uses will usually reflect the same land use type. As examples, housing will be replaced with newer housing and stores will be replaced by other stores or services. However, lot lines and the size of structures may vary as local and regional markets change. Given the great market demand for Lake Michigan frontage, vacant parcels are likely to be publicly owned or held in some form of long term conservation agreement or covenant. Knowing this, and the general pattern of existing development, the tracking of land uses at intervals of less than 20 years would be to expend considerable effort for negligible return.

At a meeting held in September, 1999, participants from Wade-Trim and the Planning and Zoning Center discussed plausible methods for determining future land use. It was determined that, given the constraints of this project, mid-term future land use (20 years +/-) could be formulated in one of three ways:

- Use a straight run from the existing MIRIS data (This option would not be available in Wisconsin where only one year is available);
- Base assumptions on known existing land use and the local zoning map, or
- Base assumptions on adopted future land use plans and local zoning.

After considering the options, it was determined by all present that in Michigan, the MIRIS land use/cover data would be used as the base with supplemental use of local land use plans, provided the plans are less than five (5) years old. In Wisconsin, the 1992 Current Use Inventory data, zoning maps and available shoreline/floodplain plans would be used.

The year 2050 projections would be determined at the completion of the year 2020 projections when comparison of existing and mid-range determinations would be available.

Existing Land Use

The existing land use composite proved to be more complicated than expected. The intention of using the MIRIS information was reconsidered and it was determined that much of the study area was classified by land cover (e.g., deciduous hardwoods, upland hardwoods) and not by land use. Specifically, the information identified several well-populated areas not as residential, but as wooded/vacant. As an alternative (in

Allegan County, MI), we obtained the existing land use information using tax assessment maps and aerial photos, supplied by the county GIS staff. This took more time than planned, but resulted in a more usable end product. Quality control in Michigan involved site visits to random locations to verify identified land use.

The Manitowoc, WI digitized existing land use information had the same deficiencies, as far as acknowledging land *cover* while dismissing the current land *use*. In addition, available parcel mapping is sporadic in the county. Efforts were made to make the existing land use maps more accurate through the addition of information found in aerial photos, local zoning ordinances and other available sources. Verification of certain landmarks and land uses was necessary in order to substantiate information and confirm assumptions, and was therefore collected through telephone contacts with local officials. Due to the limitations of the mapping data, particularly in Manitowoc County, it has been necessary to utilize ground cover boundaries rather than parcel lines. Specifically, in the northern end of the Manitowoc County study area, parcel lines were not available for a state park and it was therefore necessary to delineate this area with the use of groundcover boundaries. However, it is not likely that this deficiency has misrepresented actual park boundaries to a significant extent as park territory tends to conserve such natural features, hence their boundaries often follow tree-lines. Within the urban areas of Manitowoc County, particularly the Cities of Two Rivers and Manitowoc mapping was insufficient, as it did not include updated city boundaries. In these two instances city boundaries were redrawn, unfortunately this step resulted in a technical difficulty thereby causing inaccurate shape files (agricultural lands) to appear within the road right-of-way in the City of Two Rivers.

Through experiencing the aforementioned issues involved in the development of an existing land use map for the study areas (Allegan County, MI and Manitowoc County, WI), the following preferred and secondary methodologies are proposed. Determining which methodology to be used is directly dependant upon the availability of preferred maps/documents from the applicable cities, townships and counties. It has been established that an existing land use plan derived from the city, or township master plan, and tax assessment maps are the most useful in determining existing land use accurately. Unfortunately, the creation of master plans are not always required at the state level, and tax assessment maps are not always created by local agencies. Therefore secondary information is required, hence, a secondary method.

Nonetheless, both methods require an initial site visit to the study area. This is necessary to obtain relevant documents/maps (as previously mentioned), attain a sense of development trends, receive pertinent information from local residents and professionals, and to provide an initial review of information and verification of assumptions.

1. <u>Preferred Method (Existing Land Use)</u>

This method is directly dependent upon the availability of existing land use maps (derived from a master plan), and tax assessment maps. Assuming the information is

recent (5 years), it should provide an accurate depiction of existing land use. Within the state of Michigan a statutory requirement exists for zoning to follow an adopted plan, hence master plans are prevalent. In Wisconsin, however, these statutory requirements are not present and thus said plans are not as prevalent. Any supplementary information may also be referenced. This may include shoreline and floodplain plans, zoning maps, current land use/cover inventories, etc. Nearing completion of the existing land use map, verification is required to ensure accuracy. This may be accomplished through referencing aerial maps, telephone inquiry with local officials and site visits.

2. Secondary Method (Existing Land Use)

If the preferred information was not available or has proved to be unreliable one must become dependent upon a second set of less accurate information and verify results more vigorously. Current land use/cover maps will provide a reasonable foundation from which one can verify existing land uses. As previously mentioned, one must be aware that such information may relate to land *cover* and not land *use* (i.e. a residential lot with a large number of trees may in fact be classified as forest). Local, township, or county zoning maps will also prove to be useful. These maps will depict how particular areas have been developed or intend to be developed through the identification of land uses. One must then verify, through aerial maps, contact with local officials, or site visits, which areas have or have not been developed in that manner. This method can be utilized to create an accurate end product, however, significantly more effort is required in the verification land uses.

Note: There is no difference in the methodology used for urban and rural areas, however, it is likely that a preferable data set (master plans, tax assessment maps) is easier obtained in an urban area.

20-Year Projections

In devising 2020 land use projections for Allegan County, MI each existing future land use plan representing a portion of the County was regarded specifically. This seems reasonable given the statutory requirement for zoning to follow an adopted plan. The relatively recent updating of master plans in Allegan County contributed greatly to the probability that land uses will follow this pattern. In Wisconsin, however, such statutory requirements are not present; and as a result, our attempts at attaining any existing future land use plans in Manitowoc County, WI were unsuccessful. Projections were therefore based upon the existing land use information; discussions with local planners and zoning administrators to determine trends and ideology; sound planning principles; and local/county zoning ordinances/maps. The rationale behind the utilization of a zoning ordinance/map being that, in the absence of a land use plan, communities will encourage future development by zoning land to a desirable classification. In addition, the following information will attempt to illustrate those factors and relationships planning principles encompass in determining such projections. Planning principles take into consideration a variety of factors, including the location of existing land uses,

infrastructure, and natural features within the study areas, and their association with social, political, and economic forces. To take this point further, it could generally be stated that;

- Coastal areas typically appeal to residential developments due to the fact that scenic attributes are highly desired by potential homeowners and property values are most certain to rise over time.

- Coastal areas are also often designated as public recreation areas, by public authorities in an effort to preserve any environmental significance and to create a means, which permits all residents to benefit.

- Areas adjacent to environmentally significant areas are secured by public authorities, when possible, in an effort to provide a suitable buffer from encroaching development.

- An increase in residential development will also create a proportional increase in commercial and public areas.

- Lands adjacent to urbanized areas are likely to be developed due to the availability of required infrastructure.

- Areas situated along or at the intersection of major arterial roadways are more likely to be developed as commercial uses due to their accessibility and exposure.

Determining the 20-year projections for Allegan County, MI was fairly straightforward using the future land use plans for the communities in the study area, once the composite use categories were established. Consequently, most future land uses, like existing land uses in the area, remained as residential, agricultural, and public in nature with only the proportions of each changing significantly. Table 5 illustrates the projected changes in land use acreage from the present to the planning year 2020.

Considering an average rate of growth for the region, it has been determined that the agricultural land use acreage will diminish by 3,320 acres, or 66.1% in Allegan County. Consequently it is estimated that the majority of this acreage will be converted into residential use, thereby increasing its acreage by 15.9%. In conjunction with this residential growth, it has been projected that a proportional amount of commercial and industrial growth will occur, increasing the acreages by 4.6% and 6.1% respectively. Commercial expansion has been shown to locate within the City of Saugatuck and at several intersecting arterial corridors in the region, with industrial expansion locating adjacent to existing industry to the south of the City of Saugatuck. Although it is also typical for public/semi-public land uses to increase proportionately, no change in land use acreage has been projected due to the vast amount of existing public/semi-public lands in the County; particularly in the vicinity of the Kalamazoo River Basin.

Although the Manitowoc County, WI 2020 FLU projections proved to be more difficult and time consuming than its counterpart, it is believed that through consideration of the aforementioned principles and discussion with local planning and zoning officials, an accurate depiction has been prepared. Below, Table 6 illustrates the projected changes in land use acreage from the present to the planning year 2020. At present, several areas of the Manitowoc County, WI shoreline are still being used for agriculture. However, discussions with local officials revealed that residential development would likely begin encroaching on these lands as has occurred in similar areas of Michigan. This is due to both development pressures for the lakefront properties and pending changes in state regulations related to land division of agricultural parcels. As in Allegan County, MI it was determined that with an average rate of growth an appropriate amount of agricultural use would transition to residential development. Thus, as illustrated in Table 6, it is projected that agricultural/vacant land use will decrease by 34% from the present to the planning year 2020. Subsequently, residential land use is projected to develop into these areas and ultimately increase to 65.8%. Concurrent with this residential growth it is projected that there will be a proportionate amount of growth in public/semi-public and commercial areas, 1.3% and 2.3% respectively, to support any increase in population. It is projected that commercial areas will increase along major arterial corridors, and additional local public lands will likely be found adjacent to existing public lands and will most probably stem from bequests or other donations from private parties.

Table 5
Projected Land Use Change
Allegan County, MI

Land Use			Change – Existing – 2020			Change – 2020 - 2050	
	Existing Acreage	Projected 2020 Acreage	Numerical	Percent	Projected 2050 Acreage	Numerical	Percent
Agriculture/ Vacant	5021	1701	(3320)	(66.1)	0	(1701)	(100)
Commercial	1004	1050	46	4.6	1050	--	--
Industrial	245	260	15	6.1	260	--	--
Public/Semi-Public	2297	2297	--	--	2297	--	--
Residential	20357	23614	3257	15.9	25315	1701	7.2
Water & Wetland	1584	1584	--	--	1584	--	--

Table 6
Projected Land Use Change
Manitowoc County, WI

Land Use			Change – Existing – 2020			Change – 2020 - 2050	
	Existing Acreage	Projected 2020 Acreage	Numerical	Percent	Projected 2050 Acreage	Numerical	Percent
Agriculture/ Vacant	10951	7232	(3719)	(34)	1928	(5304)	(73.3)
Commercial	794	812	18	2.3	823	11	1.4
Industrial	1524	1576	52	3.4	1572	(3.2)	(0.2)
Public/Semi-Public	7456	7551	95	1.3	7551	--	--
Residential	5400	8954	3554	65.8	14381	5427	60.6
Water & Wetland	641	641	--	--	641	--	--

Outlined below are brief statements regarding the information necessary to utilize either the preferred or secondary methodology, as well as the steps they encompass.

1. Preferred Method (Future Land Use 2020)

This method is directly dependent upon the availability of an existing future land use map (derived from a master plan). Assuming the information is recent (5 years), a future land use map should provide the majority of necessary information. Supplementary information may also be referenced, and might include zoning map information, and sound planning principles. Verification is nevertheless required in order to assure that all factors have been considered (i.e. trends etc.). This can be achieved through referencing aerial maps, contacting local officials, site visits, etc.

2. Secondary Method (Future Land Use 2020)

If the preferred information was either unavailable or has proved to be unreliable, local, township or county zoning map information could prove to be advantageous. However, although communities attempt to encourage future development by zoning land into desirable classifications, there are various reasons as to why such efforts might not materialize. For this reason, a strong emphasis must be placed upon planning principles (outlined above); these principles will also help to project where particular uses will locate, and when. Verification of this data is extremely essential; in order to use planning principles accurately, one must have a complete understanding of development and population trends, growth, the values of the community, etc. This verification will not necessarily be required at the end stages of the method, but rather during the entire process.

50-Year Projection

In developing a methodology used to project the size, type and location of land uses for the 2050 scenario, each of the aforementioned techniques have been utilized with more emphasis placed on the study of continuing trends in the area and sound long-range planning principles. This methodology also includes the assumption that land, once developed, is unlikely to return to a vacant or agricultural use and the probability that much of the remaining non-public vacant land will convert to a developed, most likely residential, use.

As illustrated in Table 5, within Allegan County it is estimated that sufficient residential development pressures will exist to convert all the remaining agricultural use within the study area (1701 acres) by the 2050-planning year. It is projected that the same trend will occur in Manitowoc County with agricultural/vacant land use decreasing by 5304 acres and residential land uses increasing by 5427 acres from 2020 through to 2050. However, it is not projected that public/semi-public, commercial and industrial uses will increase proportionally with residential uses for several reasons.

Although it is projected that the amount of residential land will increase significantly, it is believed that the density of housing units will be minimal (i.e. one housing unit per ten acres). Further, areas already classified as residential and consisting of several small lots and cottages, may be purchased by one buyer and combined into one large parcel with one very large home ("mansionization"). The more rural areas of the county (i.e., Ganges and Casco Townships in Michigan, and Newton and Two Creeks in Wisconsin) will particularly see a shift in this type of land use. Although this trend of developing large lots will effectively spur residential development, population levels will not increase to the same extent, thereby diminishing the demand for commercial and public/semi-public uses.

According to the future land use plans and zoning ordinances that have been collected to assist in the projection of land use, it has been found that industrial and commercial expansion areas have generally been excluded. Typically, the reason for excluding such uses from a master plan would be due to the desire of residents to avoid promoting their expansion and thereby maintaining the existing community/local character. Although community residents will utilize large-scale commercial centers, they would prefer to commute outside of the study area to such centers and not promote their expansion within the community. In addition, such uses are often excluded from master plans due to the lack of existing infrastructure required to support commercial and industrial uses. For these reasons, it is believed that the amount commercial and industrial land use that has been projected for the planning year 2020 will also be sufficient for the planning year 2050.

Upon consideration of the particular hydrologic scenarios outlined in other tasks under this Delivery Order, it is evident that the overall acreage size, type of use and location of the 2050 FLU will be affected to some degree. A rise in water levels and the associated physical damages upon coastal properties and facilities will likely have the effect of forcing the relocation of some affected existing land uses into new areas. In high bluff areas, this damage is more likely to occur in the upstream area (e.g., the Kalamazoo River basin in Allegan County) than in the immediate shoreline. In estimating the new locations of each land use, it is important to consider the specific nature of each use. Those uses which find it imperative to locate along the shoreline (i.e. marinas, restaurants, industry requiring lake access) will ultimately find a new location on the waterfront and perhaps replace a different existing land use (i.e. residential). Other uses for which such a location is not imperative (i.e. retail services) might be satisfied to find a new location along a major arterial roadway, etc. It could therefore be stated that, land uses might be more prone to change with these hydrologic scenarios in urbanized areas. Within rural areas there is typically no need for commercial or industrial land uses to locate along the coastline, as well, the land is too expensive due to its mass appeal to residential development.

In addition to high water levels, low water levels will cause commercial developments along the coast to incur significant costs. Although these uses will likely not see any physical damages due to a low water level, this scenario will cause a need to relieve certain hardships created by the increased separation of structures and boats from the

new shoreline. For example, marinas will be forced to extend docks to meet the new water line, and dredge canals to create sufficient depths for the passing of boats. It is believed that by undertaking these actions and focusing on ancillary uses (i.e. storage, repairs), marinas will be able to feasibly keep their present locations. This also holds true for those industries located along the coast. Industries requiring access to water for their operation will likely extend pipes to the new water line allowing them to keep their present locations.

Bluff recession could also have a direct affect on the type of land uses located along any coastal bluffs. Whether the use of these properties, which are typically developed as residential uses, could change is directly related to the extent of recession. It is not projected that a change of use will occur if the extent of recession reduces the size of a residential yard. However, if bluff recession decreases a yard to a point where the property is not usable or completely eradicates the property and structure, it is projected that the land would either revert to a public use, or be combined with a parcel on the opposite side of the road.

In considering events which could affect development patterns, it is also necessary to consider the possibility that state legislation may be enacted which will restrict or alter future waterfront activity. Although this legislation would have little effect on already developed lands, it would affect new construction as well as redevelopment projects of the type previously discussed. Since it is impossible to predict future legislative initiatives, we have based our projections on trends under the present statutes (primarily locally based).

Conclusions

It is projected that noticeable land use changes within the counties will occur between both the present year to 2020 and the 2020 to 2050 time frames. By the planning year 2020, although a few exceptions may be expected, lands now vacant or under agricultural use will feel increasing pressure to develop into alternate land use categories. The most probable new land use will be residential; however, commercial, industrial and public lands (with the exception of Allegan County) are also expected to increase significantly.

By the planning year 2050, although the change in land use will be equally significant, the majority of growth will entail the conversion of agricultural/vacant lands to residential development. It is not projected that public/semi-public, industrial, or commercial growth will be proportional to that of residential for several reasons. The need for public and commercial areas will likely already be met by the planning year 2020 due to majority of residential growth consisting of very low densities. Commercial centers outside the study area will continue to serve area residents into the year 2050 due to the desire of residents to sustain the community/local character of the area. Finally, it is our belief that the pressure from residential groups and associations will encourage local officials carry out the future land use plans they have adopted, which generally exclude industrial or commercial expansion within the study areas.

The assumptions and findings of this report reflect land use change over a long period of time using sound, current planning principles. It must be acknowledged that extreme and sustained high or low water at any given time may cause land uses to change more quickly or more slowly than presented here. For example, an extreme high water event occurring in the years before 2020 could cause some of the vacant or currently farmed lands in Wisconsin to develop much more slowly and at much lower densities than may be now possible. Such an event may also prompt state or local lawmakers to adopt more restrictive waterfront setback regulations or limit uses to only those of least intensity (i.e. minimal densities, minimal traffic creation). Likewise, very low water levels may prompt local planning and zoning boards to relax setback requirements or other development regulations thereby setting the stage for more rapid development and increasing the potential for heightened future damage.

Exhibits

The following graphics are included as exhibits in this report:

Allegan County Existing Land Use
Allegan County Future Land Use 2020
Allegan County Future Land Use 2050
Manitowoc County Existing Land Use
Manitowoc County Future Land Use 2020
Manitowoc County Future Land Use 2050